REMARKS

The Office Action has been carefully reviewed. Reconsideration and allowance of the claims in light of the foregoing amendments is respectfully requested. A petition and fee for a three-month extension of time is submitted herewith.

Claims 1, 3-5 and 7-16 remain pending.

Claims 14-19 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) s being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made without traverse in the reply filed on 17 January 2006.

Claims 9 and 12 stand objected to because of the following informalities: "said electropolishing unit" has no antecedent basis. Appropriate correction is required.

Applicant respectfully notes that claim 1 from which both claims 9 and 12 are dependent includes language "through an acid bath contained within a polishing section of an electropolishing unit" and this language serves as the antecedent basis for the term "said electropolishing unit" in claims 9 and 12. Thus, there is no need for any correction of claims 9 and 12 and the withdrawal of the objection is urged.

Claims 1, 3-5, 7-8 and 13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Qiao (provisional application 60/483,956 of U.S. Pat. Pub.2005/0000826 A1) in view of Datta et al. (U.S. Pat. 6,228,246 B1) and Rosswag (U.S. Pat. 4,372,831).

Claims 1, 3-5, 7-8 and 13 are rejected on the same grounds as stated in the Office Action mailed on 12 July 2005. The Office Action noted that claim 1 has been amended to incorporate the features of original claim 2.

The applicants have supplied two additional declarations. One is a declaration under 37 CFR 1.131 and one is a declaration under 37 CFR 1.132. In the present Office Action, the prior declaration under 37 CFR 1.131 submitted on January 17, 2006 was considered ineffective to overcome the Qiao (US 2005/0000826 A1) reference as the evidence submitted was insufficient to establish a conception of the invention prior to the effective date of the Qiao reference. The Office Action stated that while conception is the mental part of the inventive act, it must be capable of proof, such as by demonstrative evidence or by a complete disclosure to another. Conception is more than a vague idea of how to solve a problem. The requisite means themselves and their

interaction must also be comprehended. The Office Action further asserted that the evidence provided was not commensurate with the scope of the invention.

Applicants maintain that the published reference in the Journal of Superconductor Science and Technology (published on April 10, 2003) contains demonstrative evidence of possession of the invention prior to the priority date of Qiao, i.e., July 1, 2003. Applicants have submitted an additional declaration under 37 CFR 1.131 wherein the it is stated that the scope of the publication would be understood by those of ordinary skill in the art to be commensurate with the scope of the claims in the present application. Such a publication is a clear example of a complete disclosure to another. The data contained within the publication is more than a vague idea of how to solve a problem as shown, e.g., by the abstract wherein it is stated that "we demonstrate the applicability of continuous electropolishing for the preparation of metal tapes for ion-beam assisted deposition of MgO ...roughness values below 1 nm and local slopes of less than 1° could be achieved with the electropolishing process." The applicants dispute that the scope of the declaration, i.e., the description of the publication, is not commensurate with the claims. Applicants submit that the data contained within the publication wherein an electropolishing process for a metallic tape having an initial roughness of 20 nm is clear evidence of "electropolishing metallic tape having an initial roughness of more than about 10 nm as a RMS roughness" as an initial roughness of 20 nm is clearly more than about 10 nm. Further, applicants submit that the data contained within the publication wherein an electropolishing process for a metallic tape demonstrates application of critical current densities of 0.17 A/cm^2 and 0.37 A/cm^2. is shows possession of the claimed invention wherein the electropolishing includes applying current densities of "at least 0.18 A/cm^2" and "at least 0.37 A/cm^2". Still further, applicants submit that the data contained within the publication wherein an electropolishing process for a metallic tape demonstrates achievement of roughness levels of below 1 nm is commensurate in scope with the claimed roughness level of less than about 4 nm as in claim 1 and the roughness of less than about 0.5 nm as in claims 3 and 4. Applicants have further submitted the declaration under 37 CFR 1.132 wherein it is stated: that one of ordinary skill in the art would recognize and understand that (1) the current densities recited in claim 1 of "at least 0.18 A/cm^2" and "at least 0.37 A/cm^2" fall within the range recited in the publication and (2) an upper limit of the current

densities that may be practically used for electropolishing can be determined without undue experimentation; that one of ordinary skill in the art would recognize and understand that an initial roughness of 20 nm is more than 10 nm and thus within the claimed range; and that one of ordinary skill in the art would recognize and understand that (1) a roughness of 0.5 nm as described in the publication is within the claimed range of less than 4 nm and the range of less than 0.5 nm and (2) that a lower limit to the roughness can be determined without undue experimentation.

In view of the both the prior declaration and the current two newly submitted declarations and remarks regarding the publication in the Journal of Superconductor Science and Technology by the present inventors prior to the priority date of Qiao, applicants submit that the Qiao reference is overcome. Applicants further note that this publication in the Journal of Superconductor Science and Technology is referenced in the Qiao published patent application (see paragraph [0003]) which is further evidence of the possession by the current applicants of their claimed invention, such invention supported by the data within that publication prior to the Qiao priority date. Accordingly, the rejection of claims 1, 3-5 and 7-11 under 35 U.S.C. 103(a) as being unpatentable over Qiao in view of Datta et al. and Rosswag is again urged to be withdrawn.

Claims 9 and 12 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Qiao in view of Datta and Rosswag as applied to claim 1 above, and further in view of Drummond et al. (US 2,330,562).

The Office Action stated that regarding claim 9, the cited references do not specify that the metallic tape would be in direct electrical contact with an anode in the electropolishing unit while the metallic tape is within an electrically conductive liquid throughout the electropolishing unit and within the bath in the polishing section, the bath further in contact with a cathode in the electropolishing unit so as to complete an electrical circuit. However, Drummond teaches (Fig. 1 and col. 2 line 44 – col. 3 line 6) in a continuous electropolishing method that a thin metallic strip (10) would be in direct electrical contact with an anode (26) in the electropolishing unit while the metallic tape is with an electrically conductive liquid (16) throughout the electropolising unit and with the bath in the polishing section, the bath further in contact with a cathode (22) in the electropolishing unit so as to complete an electrical circuit. It would have been obvious to combine the process of the cited prior art with the continuous elctropolishing method

of Drummond because the thin metal strip of Drummond is an analogous workpiece to the thin metallic tape of the cited prior art. The Office Action further stated that regarding claim 12, the cited references do not specify that the metallic tape would be in direct electrical contact with an anode in the electropolishing unit while the metallic tape is in contact with mechanical contacts are the metallic tape is passed through the bath so as to complete an electrical circuit. However, Drummond teaches (Fig. 1 and col. 2 line 44 – col. 3 line 6) in a continuous electropolishing method that a thin metallic strip (10) would be in direct electrical contact with an anode (24) in an electropolishing unit while the metallic tape is in contact with mechanical contacts (26) as the metallic tape is passed through the bath so as to complete an electrical circuit. It would have been obvious to one of ordinary skill in the art to combine the process of the cited prior art with the continuous electropolishing method of Drummond because the thin metal strip of Drummond is an analogous workpiece to the thin metallic tape of the cited prior art.

Applicants submit that the Qiao reference is overcome in view of the declarations and remarks presented above regarding the publication by the inventors prior to the priority date of Qiao. Accordingly, the rejection of claims 9 and 12 under 35 U.S.C. 103(a) as being unpatentable over Qiao in view of Datta et al. and Rosswag and in view of Drummond et al. is also urged to be withdrawn.

Claims 10 and 11 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Qiao in view of Datta, Rosswag and Drummond as applied to claim 9 above, and further in view of Tezuka et al. (US 5,843,290).

The Office Action stated that regarding claim 10, the cited prior art does not specify that the anode would include one of the claimed metals. However, Tezuka teaches (col. 6 lines 10-23) that it is preferable to use titanium as an anode when the electrolyte is an acidic electrolyte because the titanium is resistant to the electrolyte. It would have been obvious to modify the method of the cited prior art by forming the anode from titanium because titanium is resistant to acid electrolytes as taught by Tezuka. The Office Action stated that regarding claim 11, see the rejection of claim 5 in the Office Action filed on 12 July 2005.

Applicants again submit that the Qiao reference is overcome in view of the declarations and remarks presented above regarding the publication by the inventors prior to the priority date of Qiao. Accordingly, the rejection of claims 10 and 11 under 35

U.S.C. 103(a) as being unpatentable over Qiao in view of Datta et al., Rosswag and Drummond et al. and further in view of Tezuka et al. is urged to be withdrawn.

Claims 1, 3-5, 7-8 and 13 stand rejected under 35 U.S.C. 103(a) as being obvious over Arendt et al. (US 2003/0144150 A1).

The Office Action noted that the applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. Filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived form the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matte disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CRF 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a).

Applicants submit that the declaration under 37 CFR 1.131 regarding the publication in the Journal of Superconductor Science and Technology also shows a submission date to the journal of January 16, 2003. This date is before the effective U.S. filing date of Feb. 7, 2003 for Arendt et al. (US 2003/0144150 A1). Accordingly, applicants submit that the rejection of claims 1, 3-5, 7-8 and 13 over Arendt is overcome and this rejection should be withdrawn.

Claims 1, 3-4, 7-8 and 13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Arendt et al. (US 2003/0036483 A1) in view of Rosswag (US 4,372,831).

The Office Action stated that regarding claim 1, Arendt teaches (0015-0016) a process of providing a highly smooth surface to a metallic tape, the process comprising: electrochemical polishing a metallic tape having an initial roughness of more than about 10 nm as a RMS roughness (which inherently includes passing the metallic tape through a bath contained within a polishing section of an electropolishing unit over a

pre-selected period of time); and inherently passing a current density through the metallic tape during the period of time the metallic tape is in the bath whereby the roughness of the metallic tape is reduced to a RMS roughness of less than about 4 nm.

Still regarding claim 1, Arendt does not specify that the process would be continuous. However, it is prima facie obvious to make a bath process continuous. It would have been obvious to one of ordinary skill in the art to modify the method of Arendt by making it continuous in order to achieve the normal and expected benefits of making a batch process continuous.

Still regarding claim 1, Arendt does not specify that the bath would be an acid bath. However, Rosswag teaches (abstract, col. 1 lines 13-57) an acid electrolyte for electropolishing in order to dissolve the surface of the metal. It would have been obvious to one of ordinary skill in the art to modify the method of Arendt by providing an acid electrolyte for the bath in order to dissolve the surface of the metal as taught by Rosswag.

Still regarding claim 1, Arendt does not specify that the current density would be at least 0.18 amperes per square centimeter. However, Rosswag teaches (col. 3 lines 26-30) that industrial gloss would be obtained at lower current densities and that mirror gloss would be obtained at higher current densities. Since current density is a result-effective variable as taught by Rosswag, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to electropolish at the desired current density by a routine optimization in order to obtain the desired finish.

The Office Action stated that regarding claims 3-4, Arendt teaches (0016) that the final RMS roughness be reduced to less than about 1 nm, which overlaps with the claimed range of less than about 0.5 nm, which is prima facie evidence of obviousness. It would have been obvious to one of ordinary skill in the art to select the desired final RMS roughness form the range of roughness values disclosed by Arendt because Arendt teaches the same utility throughout the disclosed ranges.

Still regarding claims 3-4, Arendt does not specify that the current density would be at test 0.37 amperes per square centimeter. However, Rosswag teaches 9col. 3 lines 26-30) that industrial gloss would be obtained at lower current densities and that mirror gloss would be obtained at higher current densities. Since current density is a result-effective variable as taught by Rosswag, it would have been obvious to one of

ordinary skilled the art at the time of the claimed invention to electropolish at the desired current density by a routine optimization in order to obtain the desired finish.

The Office Action stated that regarding claims 7-8, Arendt teaches (0015) that the tape would be a polycrystalline metal including nickel.

The Office Action stated that regarding claim 13, the electropolishing method of Arendt would inherently include passing the metallic tape through the bath and the bath would inherently provide electrical contact with the metallic tape.

Applicants submit that Arendt specifically teaches that "as such a metal substrate can have a rough surface, it can be mechanically polished, electrochemically polished or chemically mechanically polished to provide a smoother surface" (see paragraph [0015]). But Arendt further teaches that "alternatively, the desired smoothness for subsequent depositions can be provided by the first coating layer, i.e., an inert oxide material layer." In paragraph [0016], Arendt goes on the describe the inert oxide material layer that can have a thickness from about 100 nm to about 1000 nm depending upon the roughness of the base substrate with a thicker coating layer for rougher base substrate surfaces. There is absolutely nothing in Arendt that would suggest that the presently claimed invention of an electopolishing process wherein exceptionally smooth surfaces can be obtained. Applicants strongly dispute that mention of the option of electropolishing in paragraph [0015] would inherently suggest passing a current density through the metallic tape during the period of time the metallic tape is in a bath whereby the roughness of the metallic tape is reduced to a RMS roughness of less than about 4 nm. There is simply no teaching of such a dramatic reduction in roughness via electropolishing by Arendt. It is only the teachings of the present inventors of the present invention in the current application and their prior publication in the Journal of Superconductor Science and Technology that shows such a process of electropolishing such metal substrates down to such levels of smoothness. Withdrawal of the rejection of claims 1, 3-4, 7-8 and 13 under 35 U.S.C. 103(a) over Arendt et al. in view of Rosswag is strongly urged.

Claims 1, 3-5, 7-8 and 13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Glowacki et al. (Texture development in long lengths of NiFe tapes for superconducting coated conductor) in view of Rosswag (US 4,372,831).

The Office Action stated that regarding claim 1, Glowacki teaches (pages 167-168) a continuous process of providing a highly smooth surface to a metallic tape, the process comprising: passing a metallic tape having an initial roughness of more than about 10 nm as a RMS roughness through a bath contained within a polishing section of an electropolishing unit over a preselected period of time; and passing a current density through the metallic tape during the period of time the metallic tape is in the bath whereby the roughness of the metallic tape is reduced.

Still regarding claim 1, Glowacki does not specify that the bath would be an acid bath. However, Rosswag teaches (abstract, col. 1 lines 13-57) an acid electrolyte for electropolishing in order to dissolve the surface of the metal. It would have been obvious to one of ordinary skill in the art to modify the method of Glowacki by providing an acid electrolyte for the bath in order to dissolve the surface of the metal as taught by Rosswag.

Still regarding claim 1, Glowacki does not specify that the current density would be at least 0.18 amperes per square centimeter and does not specify achieving a RMS roughness of less than about 4 nm. However, Rosswag teaches (col. 3 lines 26-30) that industrial gloss would be obtained at lower current densities and that mirror gloss would be obtained at higher current densities. Since current density is a result-effective variable as taught by Rosswag, it would have been obvious to one of ordinary skilled in the art to modify the method of Glowacki by electropolish at the desired higher current densities by a routine optimization in order to obtain the desired mirror finish. Furthermore, the examiner asserts that a mirror gloss finish would inherently have a reduced RMS roughness of less than about 4 nm.

The Office Action stated that regarding claims 3-4, Glowacki does not specify that the current density would be at least 0.37 amperes per square centimeter and does not specify achieving a RMS roughness of less than about 0.5 nm. However, Rosswag teaches (col. 3 lines 26-30) that industrial gloss would be obtained at lower current densities and that mirror gloss would be obtained at higher current densities. Since current density is a result-effective variable as taught by Rosswag, it would have been obvious to one of ordinary skill in the art to modify the method of Glowacki by electropolish at the desired higher current densities by a routine optimization in order to

obtain the desired mirror finish. Furthermore, the Examiner asserts that a mirror gloss finish would inherently have a reduced RMS roughness of less than about 0.5 nm.

The Office Action stated that regarding claim 5, Glowacki does not specify that the bath can contain a mixture of sulfuric and phosphoric acid. However, Rosswag teaches (col. 1 lines 30-39) the addition of a mixture of sulfuric and phosphoric acid to the bath in order to electropolish metallic workpieces. It would have been obvious to one of ordinary skill in the art at the time of the climbed invention to combine a mixture of sulfuric and phosphoric acid with the bath of Glowacki in order to electropolish the metallic tape as taught by Rosswag.

The Office Action stated that regarding claim 7-8, Glowacki teaches (page 167) that the tape would be nickel and does not specify that it would be single crystalline, therefore it can be assumed to be polycrystalline because polycrystalline is the naturally occurring state of nickel.

Regarding claim 13, the electropolishing method of Glowacki would inherently include passing the metallic tape through the bath and the bath would inherently provide electrical contact with the metallic tape.

Applicants submit that the specific details within Glowacki at pages 167-168 only show a static process that reduces a 200 nm rough surface down to 100 nm (see at page 167, the right column). This is far outside the presently claimed invention and fails to teach or suggest the claimed process wherein roughness is "reduced to a RMS roughness of less than about 4 nm". Applicants further dispute the assertion of the examiner that a mirror gloss finish would inherently have a reduced RMS roughness of less than about 0.5 nm as mirror gloss finish can typically be seen anywhere under about 10 nm RMS and mirror finish alone would not suggest to one of skill in the art a roughness level of less than about 4 nm or less than 0.5 nm as in the present claims. Accordingly, applicants conclude that the teachings of Glowacki in view of Rosswag fail to teach or suggest the presently claimed invention wherein exceptionally smooth surfaces can be obtained in metallic tapes, such smooth surfaces "reduced to a RMS roughness of less than about 4 nm" (claim 1) or less than 0.5 nm (claims 3 and 4). Applicants urge the withdrawal of the rejection of claims 1, 3-5, 7-8 and 13 under 35 U.S.C. 103(a) over Glowacki et al. in view of Rosswag.

Claims 9 and 12 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Glowacki in view of Rosswag as applied to claim 1 above, and further in view of Drummond et al. (US 2,330,562).

The Office Action stated that regarding claim 9, the cited references do not specify that the metallic tape would be in direct electrical contact with an anode in the electropolishing unit while the metallic tape is within an electrically conductive liquid throughout the electropolishing unit and within the bath in the polishing section, the bath further in contact with a cathode in the electopolishing unit so as to complete an electrical circuit. However, Drummond teaches (Fig. 1 and col. 2 line 44 – col. 3 line 6) in a continuous electropolishing method that a thin metallic strip (10) would be in direct electrical contact with an anode (26) in the electropolishing unit while the metallic tape is with an electrically conductive liquid (16) throughout the electropolishing unit and with the bath in the polishing section, the bath further in contact with a cathode (22) in the electropolishing unit so as to complete an electrical circuit. It would have been obvious to combine the process of the cited prior art with the continuous electropolishing method of Drummond because the thin metal strip of Drummond is an analogous workpiece to the thin metallic tape of the cited prior art.

The Office Action stated that regarding claim 12, the cited references do not specify that the metallic tape would be in direct electrical contact with an anode in the elctropolishing unit while the metallic tape is in contact with mechanical contacts as the metallic tape is passed through the bath so as to complete an electrical circuit. However, Drummond teaches (Fig. 1 and col. 2 line 44 – col. 3 line 6) in a continuous electropolising method that a thin metallic strip (10) would be in direct electrical contact with an anode (24) in an electropolishing unit while the metallic tape is in contact with mechanical contacts (26) as the metallic tape is passed through the bath so as to complete an electrical circuit. It would have been obvious to one of ordinary skill in the art to combine the process of the cited prior art with the continuous electropolishing method of Drummond because the thin metal strip of Drummond is an analogous workpiece to the thin metallic tape of the cited prior art.

Applicants submit that claims 9 and 12 are dependent upon claim 1. As the specific details within Glowacki at pages 167-168 only show a static process that reduces a 200 nm rough surface down to 100 nm (see at page 167, the right column).

This is far outside the presently claimed invention and fails to teach or suggest the claimed process wherein roughness is "reduced to a RMS roughness of less than about 4 nm". Applicants further dispute the assertion of the examiner that a mirror gloss finish would inherently have a reduced RMS roughness of less than about 0.5 nm as mirror gloss finish can typically be seen anywhere under about 10 nm RMS and mirror finish alone would not suggest to one of skill in the art a roughness level of less than about 4 nm or less than 0.5 nm as in the present claims. As applicants have shown that claim 1 is non-obvious over Glowacki et al. in view of Rosswag, applicants similarly urge the withdrawal of the rejection of claims 9 and 12 under 35 U.S.C. 103(a) over Glowacki et al. in view of Rosswag and Drummond.

Clams 10 and 11 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Glowacki in view of Rosswag and Drummond as applied to claim 9 above, and further in view of Tezuka et al. (US 5,843,290).

The Office Action stated that regarding claim 10, the cited prior art does not specify that the anode would include one of the claimed metals. However, Tezuka teaches (col. 6 lines 10-23) that it is preferable to use titanium as an anode when the electrolyte is an acidic electrolyte because the titanium is resistant to the electrolyte. It would have been obvious to modify the method of the cited prior art by forming the anode from titanium because titanium is resistant to acid electrolytes as taught by Tezuka.

The Office Action stated that regarding claim 11, see the rejection of claim 5 above.

Applicants submit that claims 10 and 11 are dependent upon claim 9 which is dependent upon claim 1. As the specific details within Glowacki at pages 167-168 only show a static process that reduces a 200 nm rough surface down to 100 nm (see at page 167, the right column). This is far outside the presently claimed invention and fails to teach or suggest the claimed process wherein roughness is "reduced to a RMS roughness of less than about 4 nm". Applicants further dispute the assertion of the examiner that a mirror gloss finish would inherently have a reduced RMS roughness of less than about 0.5 nm as mirror gloss finish can typically be seen anywhere under about 10 nm RMS and mirror finish alone would not suggest to one of skill in the art a roughness level of less than about 4 nm or less than 0.5 nm as in the present claims.

As applicants have shown that claim 1 is non-obvious over Glowacki et al. in view of Rosswag, applicants similarly urge the withdrawal of the rejection of claims 10 and 11 under 35 U.S.C. 103(a) over Glowacki et al. in view of Rosswag, Drummond and Tezuka.

In view of the foregoing amendments and remarks, claims 1, 3-5 and 7-13 are urged to be allowable over 35 U.S.C. 103. If the Examiner believes there are any unresolved issues despite this amendment, the Examiner is urged to contact the applicants' attorney undersigned below for a telephonic interview to resolve any such issue. A favorable action is solicited.

Respectfully submitted,

Date: September 15, 2006

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